REMARKS

Claims 11, 13, 14, 16-18, 20, 22, 26 and 28-30 are presently in the application. Claims 1-10, 12, 15, 19, 21, 23-25 and 27 have been canceled.

The drawings have been objected to as failing to illustrate: the "at least one of the piston pumps, combined hydraulically into a pump unit, is actuated by a different cam from the respective other piston pumps of the corresponding pump unit" of **claim 12;** "the cams are rotated by the rotary angle relative to one another with the rotary angle spacing of the cams being in the range of approximately 150°" of **claim 17;** and "the cams of the pump drive have eccentricities of different sizes" of **claims 23-25**.

Claims 23-25 have been canceled.

The subject matter of **claim 12** is actually illustrated in Fig. 4 which shows, for example, a pump unit 30a comprising piston pumps 76a, 76b and 76e and that at least one of the piston pumps 76e is actuated by a cam 26b which is different from the cam 26a that actuates the piston pumps 76a and 76b.

The subject matter of **claim 17** is actually illustrated in Fig. 3 and described as such in paragraph 22.

Since the subject of claims 12 and 17 is already illustrated in the drawings and claims 23-25 have been canceled, withdrawal of the objection to the drawings is requested.

Claim 11 has been rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The examiner sees a problem with the language "at least two pump units." Claim 11 has been amended to delete the word "at least" and simply recite "first

and second pump units." The specification clearly discloses two pump units 30a, 30b (see, for example, paragraph 26). Therefore, withdrawal of the rejection is requested.

Claim 13 has been rejected under 35 U.S.C. 112, second paragraph, as indefinite. The examiner finds that the word "preferably" renders the claim indefinite. The "preferably" language in claim 13 has been deleted and the stated preference included in a new dependent claim 30. Therefore, withdrawal of the rejection is requested.

Claims 11-22 and 26-29 have been rejected under 35 U.S.C. 103(a) as unpatentable over Willmann et al (US 6,446,435) in view of Nakazawa (US 6,065,816). Reconsideration of the rejection is requested.

Willmann et al is discussed in the present specification at paragraphs 2-5. As set forth therein, Willmann et al discloses a pump drive comprising a rotatably supported shaft and a single cam 70 located on the shaft in a manner fixed against relative rotation. This cam drives an arrangement of a total of six piston pumps, which are arranged radially around the pump drive in the same plane as the pump housing. The pistons of the various piston pumps execute a reciprocating motion and are embodied as stepped pistons, to improve the intake performance. The various piston pumps are hydraulically combined into two pump units. Both pump units are in operative communication with one another on the intake side, but serve as pressure generators for two separate brake circuits of a vehicle brake system. The individual piston pumps combined into one pump unit are arranged in a star pattern and have a rotary angle spacing of 120° from each other. Moreover, the first pump unit is phase-offset from the second pump unit by a rotary

angle of 30°. Thus none of the piston pumps is in phase opposition to any of the other piston pumps.

This geometric arrangement of the piston pumps in the pump housing is advantageous because it reduces the amplitude of the fluctuations around a mean value of the entire intake volumetric flow of the multipiston pump than is true, for instance, in a multipiston pump with a 6 x 60° arrangement of the piston pumps. In other words, less pressure pulsation occurs on the intake side of the multipiston pump. This pressure pulsation can undesirably affect the brake pedal, via a master cylinder of the vehicle brake system, and be perceived by the driver.

The hydraulic combination of the various piston pumps into two separate pump units is done by means of connecting conduits in the pump housing. In the known prior art, for reasons of installation space, these connecting conduits are embodied in a plurality of housing planes, which are spaced apart from the housing plane of the piston pumps. This has an adverse effect on the structural volume of the pump housing. Moreover, locating the piston pumps in the pump housing necessitates embodying the connecting conduits from a relatively large number of individual partial bores extending in different directions in space. This leads to comparatively high effort and cost for machining the pump housing, shorter service lives for the machining tools, and repeated reclamping operations during the machining process. In subsequent work steps, some of the partial bores must be closed off again from the environment. Besides the effort and expense for assembly, this has the potential risk of leaks.

Moreover, the known arrangement makes a desired grouping of the individual piston pumps within the pump housing more difficult and thus limits the flexibility in structurally

designing the pump housing. Aside from this, connecting bores that are relatively long and are diverted multiple times lessen the dynamics of a pressure buildup in the brake system and promote the accumulation of unwanted gas bubbles.

An object of the present invention was to propose a multipiston pump which, with unaltered good pulsation performance, can be more easily manufactured and occupies a smaller structural volume.

These objectives were achieved by applicants' invention by replacing the single cam 70 in Willmann et al with at least two axially spaced apart cams, locating the piston pumps in a number of sectional planes of the pump housing that correspond to the number of cams with the axial spacing of the cams being essentially equivalent to the axial spacing of these sectional planes and locating the connecting conduits of the pump units in a region of the pump housing defined by the sectional planes.

The examiner acknowledges that Willmann et al fails to disclosed these advantageous features of applicants' invention.

To solve the deficiencies in the Willmann et al disclosure, the examiner relies on Nakazawa and describes Nakazawa as disclosing "a similar, dual pump unit." However, the brake control apparatus disclosed by Nakazawa is most certainly not similar to the multi-piston pumps disclosed by Willmann et al and by the applicants, both of which disclose a plurality of piston pumps, which are combined hydraulically by means of connecting conduits in the pump housing into first and second pump units to supply two hydraulically separate hydraulic circuits

with pressure fluid and wherein the plurality of piston pumps of each pump unit are connected to one another in parallel fashion.

In contrast to what Willmann et al and the applicants disclose, Nakazawa discloses a single pump unit PU supplying two hydraulically separate hydraulic circuits. The pump unit in Nakazawa comprises a main pump with two piston pumps 25a, 25b and an auxiliary pump with two pump units 24a, 24b as shown in FIG. 2. The piston pumps 24a and 25a are in a first brake circuit with wheel brakes 14FR and 14RL. The piston pumps 24b and 25b are in a second brake circuit with wheel brakes 14FL and 14RR. Piston pumps 24a and 24b are associated with cam 35. Piston pumps 25a and 25b are associated with cam 57. See Fig. 2.

It is well established that the mere existence of individual features in the prior art is not in itself sufficient basis to render a claimed invention obvious under 35 U.S.C. § 103. Connell v. Sears, Roebuck & Co., 722 F.2d 1542, 1548 220 USPQ 193,199 (Fed. Cir. 1983).

As set forth in MPEP 2141,

> The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Court quoting *In re Kahn,* 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006), stated that "'[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" *KSR*, 550 U.S. at ___, 82 USPQ2d at 1396.

In the present case, the examiner's rationale is that it would have been obvious to rearrange the individual brake circuits of Willmann et al in two separate planes of the pump

housing, with two separate cams, as taught by Nakazawa, in order to reduce the amount of wear on the cam. In other words, it is the examiner's position that it would have been obvious to associate the individual pumps in Willmann's brake circuit I with one cam and the individual pumps in Willmann's brake circuit II with a second cam in order to reduce the amount of wear on a single cam.

Assuming, for the sake of argument, that the examiner is correct, the resulting device that one of ordinary skill in the art would have arrived at would not have included all of the features specified in applicants' claim 11.

Claim 11 requires that "at least one of the piston pumps, combined hydraulically into a pump unit, is actuated by a different cam from the respective other piston pumps of the corresponding pump unit." The language "at least one of the piston pumps, combined hydraulically into a pump unit, is actuated by a different cam from the respective other piston pumps of the corresponding pump unit" was previously presented in claim 12. In rejecting claim 12, the examiner finds that Willmann et al as modified by Nakazawa teaches this feature and the examiner points out that if the individual pumps in Willmann's brake circuit I were associated with one cam and the individual pumps in Willmann's brake circuit II were associated with a second cam, "the piston pump [in Willmann] that is offset by 0° is actuated by a separate cam than the corresponding pump, which is offset by 30°, of the corresponding pump unit."

The examiner's attention is directed to Fig. 4 in Willmann et al, which clearly shows that the piston pump located at 0° is in the pump unit supplying brake circuit II, while the piston pump located at 30° is in the pump unit supplying brake circuit I.

The examiner finds that it would have been obvious to associate the piston pumps located at 0°, 120° and 240° (brake circuit II) at one cam and to associated the piston pumps located at 30°, 150° and 270° (brake circuit II) at a second cam. However, arranging all of the individual pumps in Willmann's brake circuit I with one cam and all of the individual pumps in Willmann's brake circuit II with a second cam does not meet the claimed requirement that at least one of the piston pumps, combined hydraulically into a pump unit, is actuated by a different cam from the respective other piston pumps of the corresponding pump unit. For this reason, the invention defined by claim 11 is not rendered obvious by the combined teachings of Willmann et al and Nakazawa.

There is a second reason why claim 11 is not rendered obvious by the combined teachings of Willmann et al and Nakazawa.

Fig. 1 of Nakazawa is a schematic hydraulic circuit diagram of a first preferred embodiment of a brake control apparatus illustrating one of the two brake circuits.

At col. 8, ll. 42-59, Nakazawa teaches that:

> [t]he main pump 24 and the auxiliary pump 25 have operating phases offset from each other. In this embodiment, the main pump 24 and the auxiliary pump 25 have operating phases different from each other by substantially 180 degrees. Specifically, the first and second eccentric cams 35 and 57 of the camshaft 32 are so configured and arranged to actuate the corresponding plungers 36 and 58 in opposite directions to provide such substantially 180-degree different operating phases of the main pump 24 and the auxiliary pump 25. With the different operating phases, when the main pump 24 is in the suction stage, the auxiliary pump 25 is in the discharge stage, and conversely, when the main pump 24 is in the discharge stage, the auxiliary pump 25 is in the suction stage. **Particularly, it is desirable to offset the operating phases of the main pump 24 and the auxiliary pump 25 from**

> **each other in such a manner that brake fluid is discharged from the auxiliary pump 25 into the pump chamber 41 of the main pump 24 when the plunger 36 of the main pump 24 is in the suction stage.**

(Emphasis added)

What the language emphasized above means and what Fig. 1 shows is that the high-pressure side of the auxiliary piston pump 25a is hydraulically connected to the low-pressure side of main piston pump 24a. This is also shown in Fig. 2, which shows the outlet (represented by check valve 74) of piston pump 25a connected to the pump chamber of piston pump 24a and the outlet (represented by check valve 50) of piston pump 24a connected to the wheel brakes 14FR and 14 RL. Thus, unlike the piston pumps in the pump units disclosed by Willmann et al and the applicants, the piston pumps in each brake circuit disclosed by Nakazawa, e.g., main pump 24a and auxiliary pump 25a, are connected in series. Ths is exactly how it is described by Nakazawa (see, for example, col. 2, ll. 36-40; col. 5, ll. 15- 30; and col. 16, ll. 24, 25).

Applicants' Fig. 4 is a partly schematic view illustrating the geometric arrangement, hydraulic interconnection, and construction of the individual piston pumps of the multipiston pump defined by claim 11. Fig. 4 shows a first pump unit 30a and a second pump unit 30b. The first pump unit 30a includes piston pumps 76a, b located in a first sectional plane E1 containing cam 26a and piston pump 76e located in second sectional plane E2 containing cam 26b. Fig. 4 also shows that the low-pressure sides 80b of piston pumps 76a, b and e are each connected in parallel to low-pressure conduit 32 and that the high-pressure sides 80a of piston pumps 76a, b and e are each connected in parallel to high-pressure conduit 36.

In a similar manner, the second pump unit 30b includes piston pumps 76c located in first sectional plane E1 containing cam 26a and piston pumps 76d, f located in second sectional plane E2 containing cam 26b. Fig. 4 also shows that the low-pressure sides 80b of piston pumps 76c, d and f are each connected in parallel to low-pressure conduit 33 and that the high-pressure sides 80a of piston pumps 76c, d and f are each connected in parallel to high-pressure conduit 37.

Claim 11 has been amended to require that "the low-pressure sides of the piston pumps in the first pump unit" be "connected hydraulically to one another by a low-pressure conduit" and that "the high-pressure sides of the piston pumps in the first pump unit" be "connected hydraulically to one another by a high-pressure conduit." Further, claim 11 requires that "the low-pressure sides of the piston pumps in the second pump unit" be "connected hydraulically to one another by a low-pressure conduit" and that "the high-pressure sides of the piston pumps in the second pump unit" be "connected hydraulically to one another by a high-pressure conduit." This language cannot be read on the pump disclosed by Nakazawa.

In Nakazawa, the low-pressure side of piston pump 24a is connected to the high-pressure side of piston pump 25a in one pump unit and the low-pressure side of piston pump 24b is connected to the high-pressure side of piston pump 25b in the other pump unit.

In fact, Nakazawa discloses a brake control system in which the individual piston pumps in a given brake circuit are arranged in a manner that is so radically different from that disclosed in Willmann et al, that one of ordinary skill in the art would not have considered the disclosure in Nakazawa to be of any value as far as suggesting an improvement on the structure disclosed

in Willmann et al. Thus, there was no reason why one of ordinary skill in the art would have combined the teachings of Nakazawa with those of Willmann et al in the first place.

The Commissioner is hereby authorized to charge any necessary fees in connection with this communication to Deposit Account Number 07-2100.

Entry of the amendment and allowance of the application are respectfully requested.

Respectfully submitted,

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